Lloyd's Register

Rules and Regulations for the Classification of a Floating Offshore Installation at a Fixed Location, June 2013

Notice No. 1

Effective Date of Latest Amendments:

See page 1

Issue date: December 2013

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RULES AND REGULATIONS FOR THE CLASSIFICATION OF A FLOATING OFFSHORE INSTALLATION AT A FIXED LOCATION, *June 2013*

Notice No. 1

This Notice contains amendments within the following Sections of the *Rules and Regulations for the Classification of a Floating Offshore Installation at a Fixed Location, June 2013.* The amendments are effective on the dates shown:

Part	***Chapter***	***Section***	***Effective date***
3	10	5	Corrigenda
4	7	2, 3, 8, 9	Corrigenda
10	1	8, 18	Corrigenda
10	2	3, 6	Corrigenda
10	3	1	Corrigenda

It will be noted that the amendments also include corrigenda, which are effective from the date of this Notice.

The *Rules and Regulations for the Classification of a Floating Offshore Installation at a Fixed Location, June 2013* are to be read in conjunction with this Notice No. 1. The status of the Rules is now:

Rules for FOIFL	Effective date:	June 2013
Notice No. 1	Effective date:	Corrigenda

Part 3, Chapter 10

Positional Mooring Systems

CORRIGENDA

■ *Section 5*

Design analysis

5.5 Combination of low and high frequency components

(*Part only shown*)

5.5.4 Estimates of maximum design values can be based on the following:

(b) **Wave frequency**:

$$X_{\text{WF sig}} = 2\sigma_{x\,\text{WF}}$$

$$X_{\text{WF max}} = \sigma_{x\,\text{WF}} \cancel{\sqrt{2(\ln N_{\text{LF}})}} \quad \sqrt{2(\ln N_{\text{WF}})}$$

$$T_{\text{WF sig}} = 2\sigma_{T\,\text{WF}}$$

$$T_{\text{WF max}} = \sigma_{T\,\text{WF}} \cancel{\sqrt{2(\ln N_{\text{LF}})}} \quad \sqrt{2(\ln N_{\text{WF}})}$$

where

$X_{\text{WF sig}}$ = significant wave frequency offset
$X_{\text{WF max}}$ = maximum wave frequency offset
$T_{\text{WF sig}}$ = significant wave frequency tension
$T_{\text{WF max}}$ = maximum wave frequency tension
$\sigma_{x\,\text{WF}}$ = standard deviation of wave frequency offset
$\sigma_{T\,\text{WF}}$ = standard deviation of wave frequency tension
N_{WF} = number of wave frequency oscillations during short-term storm state (not less than three hour storm)
ln = $\log_e$
e = base of natural logarithms, 2,7183.

Part 4, Chapter 7
Local Strength

CORRIGENDA

■ *Section 2* Design heads

2.3 Stowage rate and design heads

(*Part only shown*)

Table 7.2.1 Design heads and permissible deck loadings (SI units) (*see continuation*)

Structural item and position	Standard stowage rate C, in m^3/tonne	Design loading p, in kN/m^2	Equivalent design head h_i in metres	
2. Other decks				
(a) Loading for minimum scantlings				
(i) Work areas	1,39	9,0	h_2 1,28	
(ii) Storage areas	1,39	14,13	h_3 2,0	
(iii) Decks forming crown of deep tanks	C	$\cancel{\frac{9,82h}{c}}$ $\frac{9,82h}{C}$ (*See* Note 2)	h_4 h (*See* Note 2)	
(iv) Accommodation decks	1,39	8,5	h_5 1,2	
(b) Specified deck loading				
(i) All areas	1,39	$p_a + 14,41E$ but not less than (a) above	h_2, h_3, h_5 $0,14p_a$	
(c) Superstructure decks (*see* Note 3)			h_6	
(i) 1st tier	—	—	0,9 (*See* Note 4)	
(ii) 2nd tier			0,6	
(iii) 3rd tier and above			0,45	
(d) Walkways and access areas	1,39	4,5	h_7 0,64	
3. Watertight bulkheads	0,975	$10,07h_4$	h_4 *see* Table 7.7.1	
4. Deep tank bulkheads	C but $\leq 0,975$	$\cancel{\frac{9,82h_4}{c}}$ $\frac{9,82h_4}{C}$	h_4 *see* Table 7.7.1	

Part 4, Chapter 7

(*Part only shown*)

Table 7.2.1 Design heads and permissible deck loadings (metric units) (*see continuation*)

Structural item and position	Standard stowage rate C, in m^3/tonne	Design loading p, in tonne-f/m^2	Equivalent design head h_i in metres	
1. All units except ship units				
(a) Weather decks	—	—	h_1	
(b) Loading for minimum scantlings				
(i) Exposed deck	1,39	0,92 + ~~14,417*E*~~ 1,467*E*	1,28 + 2,04*E*	
(c) Specified deck loading				
(i) Exposed deck	1,39	p_a + ~~14,41*E*~~ 1,467*E* but not less than (a) above	0,14p_a + 2,04*E*	
2. Other decks				
(a) Loading for minimum scantlings				
(i) Work areas	1,39	0,92	h_2 1,28	
(ii) Storage areas	1,39	~~14,13~~ 1,44	h_3 2,0	
(iii) Decks forming crown of deep tanks	*C*	$\cancel{\frac{9{,}82h}{C}}$ $\frac{h}{C}$ (*see* Note 2)	h_4 h (*see* Note 2)	
(iv) Accommodation decks	1,39	~~8,5~~ 0,865	h_5 1,2	
(b) Specified deck loading				
(i) All areas	1,39	p_a + ~~14,41*E*~~ 1,467*E* but not less than (a) above	h_2, h_3, h_5 0,14p_a	
(c) Superstructure decks (*see* Note 3)			h_6	
(i) 1st tier	—	—	0,9 (*see* Note 4)	
(ii) 2nd tier			0,6	
(iii) 3rd tier and above			0,45	
(d) Walkways and access areas	1,39	0,46	h_7 0,64	

Section 3
Watertight shell boundaries

3.2 Column-stabilised and tension-leg units

(*Part only shown*)

Table 7.3.2 Watertight shell boundaries of the upper hull of column-stabilised units and tension-leg units

Items and requirement	Boundaries of upper hull
(1) Shell plating thickness, general *See also* 3.1.5	The greater of the following: (a) t = ~~$0{,}004sf\sqrt{h_4}\ k$~~ $0{,}004s\,f\sqrt{h_4\,k}$ mm (b) t = $0{,}012s_1\sqrt{k}$ but not less than 7,5 mm
(2) Bottom plating thickness between columns within $\frac{W}{2}$ outside of column shell but not less than two web frame spaces *See also* 3.1.5	The greater of the following: (a) t = ~~$0{,}004sf\sqrt{h_4}\ k + 2{,}5$~~ $0{,}004s\,f\sqrt{h_4\,k} + 2{,}5$ mm (b) t = $0{,}012s_1\sqrt{k}$ but not less than 7,5 mm

Section 8
Double bottom structure

8.3 Self-elevating units

8.3.15 **Plate floors** are to be fitted under heavy machinery items and under bulkheads and elsewhere at a spacing not exceeding 3,8 m. The thickness of non-watertight plate floors is to be not less than:

$$t = (0{,}009d_{\text{DB}} + 1)\sqrt{k}\ \text{mm}$$

nor less than 6,0 mm. The thickness need not be greater than 15 mm, but the ratio between the depth of the double bottom and the thickness of the floor is not to exceed ~~130*k*~~ $130\sqrt{k}$. This ratio may, however, be exceeded if suitable additional stiffening is fitted. Vertical stiffeners are to be fitted at each bottom shell stiffener, having a depth not less than 150 mm and a thickness equal to the thickness of the floors. For units of length, L, less than 90 m, the depth is to be not less than $1{,}65L$ mm, with a minimum of 50 mm.

Section 9
Superstructures and deckhouses

9.2 Symbols

(*Part only shown*)

9.2.1 The following symbols and definitions are applicable to this Chapter, unless otherwise stated:

$$\beta = 1{,}0 + \left(\frac{\left(\frac{X}{L}\right) - 0{,}45}{(C_{\text{b}} + 0{,}2)}\right)^2 \quad \text{for } \frac{X}{L} \le 0{,}45$$

$$= 1{,}0 + 1{,}5\left(\frac{\left(\frac{X}{L}\right) - 0{,}45}{(C_{\text{b}} + 0{,}2)}\right)^2 \quad \cancel{\text{for } \frac{X}{L} \le 0{,}45}$$

$$\text{for } \frac{X}{L} > 0{,}45$$

9.5 Bulkhead plating and stiffeners

9.5.1 The plating thickness, t, of fronts, sides and aft ends of all erections other than the sides of the superstructures where these are an extension of the side shell, is not to be less than:

$$t = 0{,}003s\sqrt{k\,h}\ \text{mm},$$

but in no case is the thickness to be less than:

(a) for the lowest tier:

$$t = (5{,}0 + 0{,}01L_3)\sqrt{k}\ \text{mm},$$

but not less than 5,0 mm.

(b) for the upper tiers:

$$t = (4{,}0 + 0{,}01L_3)\sqrt{k}\ \text{mm},$$

but not less than 5,0 mm.

Part 10, Chapter 1
General Requirements

CORRIGENDA

■ *Section 8*
Structural idealisation

8.5 Effective plastic section modulus and shear area of stiffeners

(*Part only shown*)

Table 1.8.1 Characteristic flange data for HP bulb profiles (*see* Fig. 1.8.1)

NOTE
Characteristic flange data converted to net scantlings are given as:
$b_f = b_{f\text{-}grs}^* + 2t_{w\text{-}net}$
$t_{f\text{-}net} = t_{f\text{-}grs}^* - \cancel{t_{corr}}\ t_c$
$t_{w\text{-}net} = t_{wgrs} - \cancel{t_{corr}}\ t_c$

CORRIGENDA

■ *Section 18*
Buckling

18.1 General

(*Part only shown*)

18.1.1 **Symbols**. The symbols used in this Chapter are defined as follows:

~~η = buckling utilisation factor, as defined in 18.2.1.1, 18.3.2.2, 18.3.3.1, 18.4.1.1 and 18.5.1.1~~

σ_E = reference stress, in N/mm^2

$$= 0{,}9E\left(\frac{t_{net}}{l_a}\right)^2$$

18.2 Buckling of plates

18.2.1 **Uni-axial buckling of plates**.

18.2.1.2 Reference degree of slenderness, to be taken as:

$$\lambda = \cancel{\sqrt{\frac{\sigma_{yd}}{\kappa\sigma_E}}}\quad\sqrt{\frac{\sigma_{yd}}{K\sigma_E}}$$

Part 10, Chapter 2
Loads and Load Combinations

CORRIGENDA

■ *Section 3*
Dynamic load components

3.3 Environmental FOI factors (EFF)

(*Part only shown*)

Table 2.3.2 Environmental FOI factors (EFF)

NOTES

~~TBA: Factor will be advised by LR upon request.~~

3.5 Motions

(*Part only shown*)

3.5.3.2 The pitch amplitude, φ, is to be taken as:

~~$\varphi = 1350 f_{FOI\ pitch} L^{-0{,}94}\,[1 + F_n^{1{,}2}]$ degrees~~

$\varphi = 1350L^{-0{,}94}\,[1 + F_n^{1{,}2}]$ degrees

■ *Section 6*
Combination of loads

6.3 Application of dynamic loads

(*Part only shown*)

6.3.4.1 The simultaneously acting dynamic wave pressure, $P_{wv\text{-}dyn}$, is to be taken as follows, but not to be less than $-\rho_{sw}\, g\, (T_{LC} - z)$ below still waterline or less than 0 above still waterline:

- For the port and starboard side within the region without a defined bilge:

$P_{wv\text{-}dyn} = P_{WL} - 10\,(z - T_{LC})$ above still waterline

~~where~~

~~P_{ctr} = dynamic wave pressure at bottom centre-line, to be taken as:~~

~~= $f_{ctr}\, P_{ex\text{-}max}$ kN/m²~~

~~P_{bilge} = dynamic wave pressure at $z = 0$ and $y = B_{local}/2$, to be taken as:~~

~~= $f_{bilge}\, P_{ex\text{-}max}$ kN/m²~~

~~P_{WL} = dynamic wave pressure at waterline, to be taken as:~~

~~= $f_{WL}\, P_{ex\text{-}max}$ kN/m².~~

where

P_{ctr} = dynamic wave pressure at bottom centreline, to be taken as:

= $f_{ctr}\, P_{ex\text{-}max}$ kN/m^2

P_{bilge} = dynamic wave pressure at $z = 0$ and $y = B_{local}/2$, to be taken as:

= $f_{bilge}\, P_{ex\text{-}max}$ kN/m^2

P_{WL} = dynamic wave pressure at waterline, to be taken as:

= $f_{WL}\, P_{ex\text{-}max}$ kN/m^2.

Part 10, Chapter 3

Scantling Requirements

CORRIGENDA

Section 1
Scantling requirements

1.3 Hull girder bending strength

(*Part only shown*)

Table 3.1.1 Loads and corresponding acceptance criteria for hull girder bending assessment

Design load combination	Still water bending moment, $M_{sw\text{-}perm}$	Vertical wave bending moment, $M_{wv\text{-}v}$	Permissible hull girder bending stress, σ_{perm}, *see* Note	
(S)	$M_{sw\text{-}perm}$	0	~~143/(f_{FOI} k)~~ 143/k	within 0,4L amidships
			~~105/(f_{FOI} k)~~ 105/k	at and forward of 0,9L from AP and at and aft of 0,1L from AP
(S + D)	$M_{sw\text{-}perm}$	$M_{wv\text{-}v}$	~~190/(f_{FOI} k)~~ 190/k	within 0,4L amidships
			~~140/(f_{FOI} k)~~ 140/k	at and forward of 0,9L from AP and at and aft of 0,1L from AP

1.4 Hull girder shear strength

(*Part only shown*)

Table 3.1.2 Loads and corresponding acceptance criteria for hull girder shear assessment

Design load combination	Still water shear force, $Q_{sw\text{-}perm}$	Vertical wave shear force, Q_{wv}	Permissible shear stress, τ_{perm}
(S)	$Q_{sw\text{-}perm}$	0	~~105/(f_{FOI} k)~~ for plate ij 105/k
(S + D)	$Q_{sw\text{-}perm}$	Q_{wv}	~~120(f_{FOI} k)~~ for plate ij 120/k

(*Part only shown*)

Symbols

i = index for the structural member under consideration
1, for the side shell
2, for the inner hull
3, for the longitudinal bulkhead

$A_{i\text{-}net50}$ = net area based on deduction ~~0,5t_{corr}~~ 0,5t_{c}, of the structural member, i, at one side of the section under consideration. The area $A_{3\text{-}net50}$ for the centreline bulkhead is not to be reduced for symmetry around the centreline

Fig. 3.1.1 Shear force distribution factors

(*Part only shown*)

1.4.2.2 The permissible positive and negative still water shear forces, $Q_{sw\text{-}perm}$, are to satisfy the following for each loading condition:

t_{net50} = net thickness of plate, in mm
= t_{grs} – 0,5~~t_{corr}~~ t_C
~~t_{corr}~~ t_C = corrosion addition, in mm, as defined in Ch 1,12

(*Part only shown*)

1.4.3.1 For longitudinal bulkheads between cargo tanks, the effective net plating thickness of the plating above the inner bottom, $t_{sfc\text{-}net50}$ for plate ij, used for calculation of hull girder shear strength, $Q_{v\text{-}net50}$, may be corrected for local shear distribution and is given by:

$t_{sfc\text{-}net50}$ = t_{grs} – 0,5~~t_{corr}~~ t_C – t_Δ mm

where

t_{grs} = gross plate thickness, in mm
~~t_{corr}~~ t_C = corrosion addition, in mm, as defined in Ch 1,12
t_Δ = thickness deduction for plate ij, in mm, as defined in 1.4.3.2.

(*Part only shown*)

1.4.3.6 For ship units with two longitudinal bulkheads between the cargo tanks, the correction factor, K_3, in way of transverse bulkheads is to be taken as:

NOTE

$A_{T\text{-}net50}$ = net shear area of the transverse wash bulkhead, including the double bottom floor directly below, in the side cargo tank, in cm^2, taken as the smallest area in a vertical section. $A_{T\text{-}net50}$ is to be calculated with net thickness given by t_{grs} – 0,5~~t_{corr}~~ t_C
$A_{Q\text{-}net50}$ = net shear area, in cm^2, of a transverse primary support member in the wing cargo tank, taken as the sum of the net shear areas of floor, cross ties and deck transverse webs
$A_{Q\text{-}net50}$ is to be calculated using the net thickness given by t_{grs} ~~– 0,5tcorr~~ – 0,5t_C. The net shear area is to be calculated at the midspan of the members
$I_{psm\text{–}net50}$ = net moment of inertia for primary support members, in cm^4, of a transverse primary support member in the wing cargo tank, taken as the sum of the moments of inertia of transverses and cross ties. It is to be calculated using the net thickness given by t_{grs} ~~– 0,5tcorr~~ – 0,5t_C. The net moment of inertia is to be calculated at the midspan of the member, including an attached plate width equal to the primary support member spacing
t_{grs} = gross plate thickness, in mm
~~t_{corr}~~ t_C = corrosion addition, in mm, as defined in Ch 1,12.

1.5 Hull girder buckling strength

1.5.2.2 The buckling strength for the buckling assessment is to be derived using local net scantlings, t_{net}, as follows:

t_{net} = t_{grs} – 1,0~~t_{corr}~~ t_C mm

where

t_{grs} = gross plate thickness, in mm
~~t_{corr}~~ t_C = corrosion addition, in mm, as defined in Ch 1,12.

(*Part only shown*)

1.5.2.5 The design hull girder shear stress for the buckling assessment, $\tau_{hg\text{-}net50}$, is to be calculated based on net hull girder sectional properties and is to be taken as:

$t_{ij\text{-}net50}$ = net thickness for the plate ij, in mm
= $t_{ij\text{-}grs}$ – 0,5~~t_{corr}~~ t_C
~~t_{corr}~~ t_C = corrosion addition, in mm, as defined in Ch 1,12

(*Part only shown*)

1.5.2.6 The compressive buckling strength of plate panels is to satisfy the following criteria:

σ_{cr} = critical compressive buckling stress, σ_{xcr} or σ_{ycr} as appropriate, in N/mm^2, as specified in Ch 1,18.2.1.3. The critical compressive buckling stress is to be calculated for the effects of hull girder compressive stress only. The effects of other membrane stresses and lateral pressure are to be ignored. The net thickness given as t_{grs} – ~~t_{corr}~~ t_C as described in Ch 1,12 is to be used for the calculation of σ_{cr}
~~t_{corr}~~ t_C = corrosion addition, in mm, as defined in Ch 1,12.

(*Part only shown*)

1.5.2.7 The shear buckling strength of plate panels, is to satisfy the following criteria:

τ_{cr} = critical shear buckling stress, in N/mm^2, specified in Ch 1,18.2.1.3. The critical shear buckling stress is to be calculated for the effects of hull girder shear stress only. The effects of other membrane stresses and lateral pressure are to be ignored. The net thickness t_{grs} – ~~t_{corr}~~ t_C as described in Ch 1,12 is to be used for the calculation of τ_{cr}
~~t_{corr}~~ t_C = corrosion addition, in mm, as defined in Ch 1,12.

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